

An Outline of the Family Microzetidae Grandjean, 1936 (Acari: Oribatei)

By

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Grandjean (1936) was the first to summarize our systematical information concerning the family Microzetidae. In his paper, he relegated three previously described species to the family, namely *Sphaerozetes mirandus* Berlese, 1908, *Microzetes ornatissimus* Berlese, 1913 and *Oribata brevis* Warburton, 1913. He also described three new taxa, the species *Phylacozetes membranulifer* Grandjean, 1936, *Acaroceras odontotus* Grandjean, 1936, and *Nellacarus petrocortensis* Grandjean, 1936, all of them being the representatives of also new genera. In the same year, he described the species *Microzetes auxiliaris* Grandjean, 1936, since the type species of the genus *Microzetes* Berlese, 1913, *Sphaerozetes mirandus* Berlese, 1908, is very insufficiently diagnosed. As against the 4 known genera and 7 species of the family in 1936, there are today 19 genera and 41 species allocated to it. This unsuspected increase of the taxa makes it necessary to give an outline of the family Microzetidae. The present paper, the same as all previous publications of the author, serves to facilitate the identification of oribatids. For this very purpose, it contains but the simplest, easily recognizable differential characteristics, discernible as far as possible in the dorsoventral view, for the sake of identification. Thus the figures too attempt to display mainly these features and the general habits of the species, without striving to depict every detail. It is the view of the author that, in the present backward state of oribatidology, one must attempt in the first line to know the oribatids of the soils of the different continents. This project will prove successful only if some help is given to as many young zoologists as possible to adjoin the study of oribatidology. Their participation, however, can only be promoted by the acceleration and simplification of identifying work. Author is quite aware of the fact that, by this promotion of an extensive nature of oribatidology, similarly intensive researches are just as important,—giving rise to extremely detailed descriptions, informations on developmental stages, and their phylogenetical evaluations. The progress of the entire field will, however, be assured only by ascribing an equally important role to both extensive and intensive studies.

The family Microzetidae Grandjean, 1936, belongs, in Grandjean's system (1953), to the "Oribates supérieurs", group 11. Circumdehiscenciae, and section "Euphérédermes". In Balogh's system (1961), it is to be found in group II. Oribatei superiores, series Pycnonoticae, superfamily 11. Cepheoidea. The criteria of the family are the same in both systems, namely:

1. pteromorpha present,
2. notogaster without areae porosae,
3. upper process of mandible with bacilliform appendage,
4. prodorsum mainly with complicated lamellae and chitinous membrane.

This combination of features are nowhere else to be found in any oribatid family, so that the microzetids can be sharply delimited by their combined use. Their habits are so characteristic that, with some practice, they can be recognized immediately.

In identification work, the following characteristics can be used:

Prodorsum

Sensillus: proclinate or proclinate to external, and reclinate or reclinate to external. Both types might be either filiform or fusiform. The four possible combinations are therefore as follows:

1. proclinate, filiform (Fig. 1—24),
2. proclinate, fusiform (Fig. 25—28),
3. reclinate, filiform (Fig. 33—34),
4. reclinate, fusiform (Fig. 30, 31).

Interlamellar hairs: mostly present, rarely absent, originating either in the interlamellar region or on the lamellae themselves. The possible combinations of the interlamellar hairs:

1. absent (Fig. 2—7),
2. arising interlamellarly, long (Fig. 33),
3. arising interlamellarly, short (Fig. 30),
4. arising on lamella, long (Fig. 8—24),
5. arising on lamella, short (Fig. 28, 34).

Lamellar hairs: of various shapes: flagelliform (Fig. 16) setiform (Fig. 23), bacilliform (Fig. 26), sphaerical (Fig. 36), bifurcate (Fig. 32), bacilliform with long cilia (Fig. 11—14), plumose (Fig. 3). According to position:

1. arising below cuspis, proclinate (Fig. 7),
2. arising at inner margin of lamellae (Fig. 6, 25),
3. arising below lamellae, entirely covered by lamellae (Fig. 8).

Rostral hairs: mostly flagelliform, rarely constituting an identificational feature.

Lamellae: generally wide and large, covering considerable portion of prodorsum, cuspis frequently incised. Inner or outer margins sometimes continuing in chitinous membranula (Fig. 1, 2).

Lamellar apophyses: a paired, antler- or angle-shaped process, situated on the inner margin of lamellae, in apical half of interlamellar region (Fig. 10, 14).

Interlamellar apophysis: an unpaired, simple or bifurcate, sometimes fungus-shaped process, situated medially in basal portion of interlamellar region (Fig. 15—21).

Interlamellar region: triangular or rarely quadrangular portion, delimited by lamellae and dorsosejugal suture, of prodorsum.

Notogaster

Nine pairs of notogastral hairs; 1—5 pairs occasionally much longer than others (Fig. 40). On notogaster, and mostly centrally, 1—2 indistinct areoles, resembling areolae porosae, might occur (Fig. 30, 40). Pteromorphae well developed, peloptoid, sometimes tapering anteriorly (Fig. 33). Sometimes 4—10 assymmetric, longitudinal chitinous lines (Fig. 10, 24), or system of lines covering entire notogaster present (Fig. 22).

Ventral region

6 pairs of genital, 2 pairs of anal, 1 pair adgenital, and 3 pairs of adanal hairs. Hairs mostly very short, but 1—2 pairs of genital hairs and some epimeral hairs might sometimes be strikingly long. Usually a broad, chitinous band curving anteriorly in front of genital plate. Genital and anal plates separated by a distance considerably smaller than their length. Ventral region frequently with longitudinal, slightly undulating chitinous lines.

Identification key of microzetid genera

- 1 (24) Sensillus proclinate.
- 2 (19) Sensillus filiform, ciliate.
- 3 (10) Interlamellar hairs very small or absent.
- 4 (5) Lamellae very broad, with inclinate chitinous membranes almost meeting in median line. Rostrum with nose-like process, bearing two minute rostral hairs. Lamellar hair not visible. Notogaster, when viewed from above, more than twice as long as wide. — South America (Figs. 1—2):

Dinozetes Balogh, 1962

- 5 (4) Lamellae without inclinate chitinous membranes; rostrum without nose-like process; rostral hairs long, frequently flagellate; lamellar hairs always present.
- 6 (7) Lamellar hairs arising in front of cuspis, on inner margin of lamellae ending considerably before rostrum. Two semicircular interlamellar apophyses present. — South America (Fig. 6):

Mystacozetes Balogh, 1962

- 7 (6) Lamellar hairs arising on or below cuspis, proclinate or procinate to erect. Lamellae extending almost to rostrum.
- 8 (9) Lamellae very wide, almost meeting in median line in front of cuspis; cuspis obliquely truncate, or biapical, with large lateral tooth. — South America (Figs. 3—5):

Schalleria Balogh, 1962

- 9 (8) Lamellae not strikingly wide, at a distance from each other in median line before cuspis as width of lamella. Lamellae without lateral tooth. — South America (Fig. 7):

Orthozetes Balogh, 1962

- 10 (3) Interlamellar hairs long.
- 11 (12) Lamellar apices terminating in rounded chitinous membrane. Lamellar hairs below lamella, tips not extending over and beyond lamellar apices. — South America (Figs. 8—9):

Phylacozetes Grandjean, 1936

- 12 (11) Lamellar apices obliquely truncate or 2—3 furcate, tip of lamellar hair invariably extending beyond lamellar apices.
- 13 (14) A lamellar apophysis each on inner side of lamellae, ramifying like an antler, polyapical. Lamellar hairs with long cilia. — Orb. terr. (Figs. 10—14):

Microzetes Berlese, 1913

- 14 (13) No ramifying lamellar apophysis on inner margin of lamellae. Lamellar hairs smooth, not ciliated.
- 15 (16) Interlamellar region with interlamellar apophysis in median line. — South America (Figs. 15—21):

Acaroceras Grandjean, 1936

- 16 (15) Interlamellar region without interlamellar apophysis.
17 (18) Lamellar apices obliquely truncate, cuspis with one apex. —
West Africa, South America (Figs. 22—23):

Rugozetes Balogh, 1960

- 18 (17) Lamella with 3 sharp apices. — South America (Fig. 24):

Schizozetes Balogh, 1962

- 19 (2) Apex of sensillus incrassately fusiform or clavate.
20 (21) Lamellar hairs arising on inner margin of lamellae. — South
America (Fig. 25):

Protozetes Balogh, 1962

- 21 (20) Lamellar hairs arising on lamellar apices.
22 (23) Sensillus slightly fusiform. Pteromorphae hardly extending
beyond outline of body when viewed from above. Ventral
plate with longitudinal median lines*. — South America
(Fig. 29):

Anakingia Hammer, 1961

- 23 (22) End of sensillus strongly incrassate. Pteromorphae extending
from outline of body when viewed from above. Ventral plate
without longitudinal lines. — Madagascar, South America
(Figs. 26—28):

Rhopalozetes Balogh, 1961

- 24 (1) Sensillus reclinate.
25 (32) Interlamellar hair arising in interlamellar region.
26 (29) Interlamellar hair very small. Sensillus slightly fusiform.
27 (28) Lamellae convergent, cuspis meeting. Rostral region without
complicated structure. — Southeast Europe (Fig. 30):

Miracarus Kunst, 1959

- 28 (27) Lamellae parallel, cuspis not meeting. Rostral region with
complicated structure. — South America (Fig. 31):

Mysterozetes Hammer, 1961

* Doubtful whether belonging to the family Microzetidae.

- 29 (26) Interlamellar hairs long, sensillus filiform.
 30 (31) Interlamellar region quadrangular, lamellae parallel. Lamellar hairs bifurcate, arising on cuspis. Pteromorphae straightly truncate in front. — Madagascar. (Fig. 32):

Hymenozetes Balogh, 1961

- 31 (30) Interlamellar region triangular, lamellae strongly convergent. Lamellar hairs simple, arising on inner margin of lamellae. Pteromorphae with proclinate, pointed process. — West Africa (Fig. 33):

Oxyzetes Balogh, 1958

- 32 (25) Interlamellar hairs arising on lamellae.
 33 (34) Interlamellar hairs very small. Lamellae almost parallel, inner margins meeting in considerable length. — Europe, South America (Figs. 34—38):

Nellacarus Grandjean, 1936

- 34 (33) Interlamellar hairs large; spiniform or long.
 35 (36) Dorsosejugal suture present. Interlamellar hairs thin, long. Pteromorphae not strikingly extending laterally. All notogastral hairs thin and subequal. — West Africa (Fig. 39):

Megazetes Balogh, 1959

- 36 (35) Dorsosejugal suture absent. Interlamellar hairs thick, spiniform. Pteromorphae considerably projecting laterally. 3 pairs of long, lanceolate notogastral hairs. — West Africa (Fig. 40):

Acanthozetes Balogh, 1958

Dinozetes Balogh, 1962

Sensillus proclinate, filiform, ciliate. Interlamellar hairs either absent or minute, arising on chitinous membranula of lamellae. Lamellar hairs indiscernible. Lamellae extraordinarily wide, of a striking lateral position, continuing in a membranula each, meeting or almost meeting by a process in median line. Rostrum terminating in bifurcate chitinous apex, bearing minute rostral hairs. When viewed from above, notogaster at least twice as wide as long, much vaulted laterally, prodorsum extremely flat. 2 South American species.

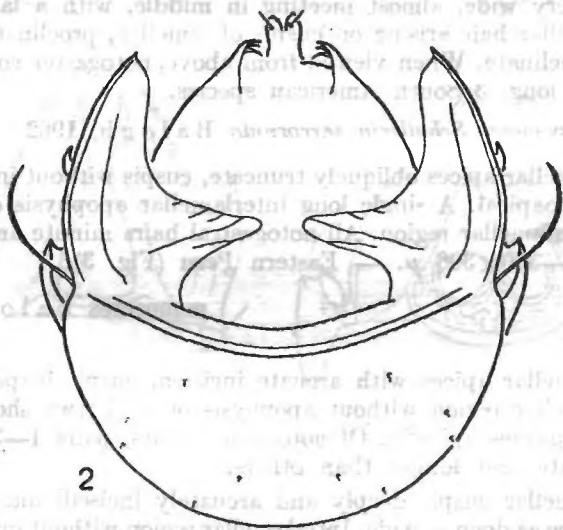
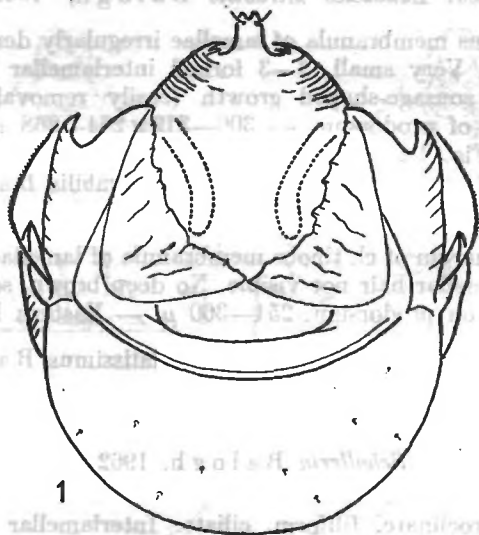


Fig. 1: *Dinozetes mirabilis* Balogh, 1961. —

Fig. 2: *Dinozetes latissimus* Balogh, 1962.

Type species: *Dinozetes mirabilis* Balogh, 1962.

1. (2) Chitinous membranula of lamellae irregularly dentate on inner margin. Very small, 2—3 forked interlamellar hair. A deep brown, sausage-shaped growth (easily removable) each on surface of prodorsum. — $306-319 \times 264-268 \mu$. — Eastern Peru (Fig. 1):

mirabilis Balogh, 1962

2. (1) Inner margin of chitinous membranula of lamellae not dentate. Interlamellar hair not visible. No deep brown, sausage-shaped growth on prodorsum. $254-360 \mu$. — Eastern Peru (Fig. 2):

latissimus Balogh, 1962

Schalleria Balogh, 1962

Sensillus proclinate, filiform, ciliate. Interlamellar hairs absent. Lamellae very wide, almost meeting in middle, with a large lateral tooth. Lamellar hair arising on cuspis of lamellae, proclinate or proclinate to inclinate. When viewed from above, notogaster considerably wider than long. 3 South American species.

Type species: *Schalleria sexcornuta* Balogh, 1962.

1. (2) Lamellar apices obliquely truncate, cuspis without indentation, monoapical. A single long interlamellar apophysis on base of interlamellar region. All notogastral hairs minute and smooth. $376-380 \times 306 \mu$. — Eastern Peru (Fig. 3):

monoceros Balogh, 1962

2. (1) Lamellar apices with arcuate incision, cuspis biapical. Interlamellar region without apophysis or with two short pointed apophyses apically. Of notogastral hairs, pairs 1—3 in row *r* ciliate and longer than others.

3. (4) Lamellar cuspis deeply and arcuately incised, incision about twice as deep as wide. Interlamellar region without interlamellar apophysis. Hair r_3 ciliate and longer than others. Notogastral hairs surrounded with large, circular chitinous ring. $366 \times 296 \mu$. — Eastern Peru (Fig. 5):

sexcornuta Balogh, 1962

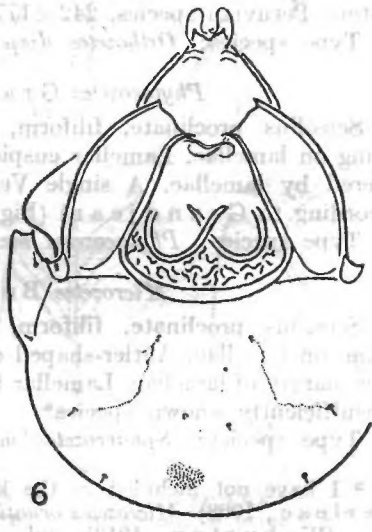
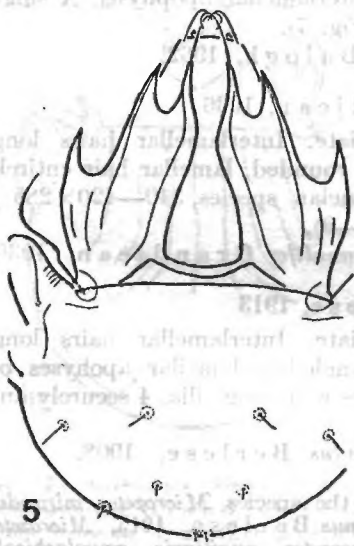
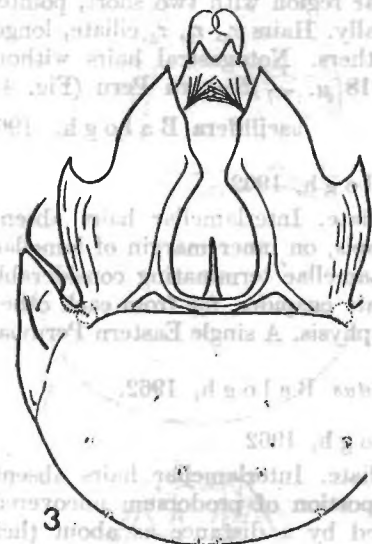


Fig. 3: *Schalleria monoceros* Balogh, 1962. — Fig. 4: *Schalleria bacillifera* Balogh, 1962. — Fig 5: *Schalleria seacornuta* Balogh, 1962. — Fig. 6: *Mystacozetes ornatus* Balogh, 1962.

- 4 (3) *Lamellar apices* slightly and arcuately incised; incision about as deep as wide. Interlamellar region with two short, pointed interlamellar apophyses apically. Hairs r_1 , r_2 , r_3 ciliate, longer and slightly thicker than others. Notogastral hairs without large chitinous rings $319 \times 218 \mu$. — Eastern Peru (Fig. 4):

bacillifera Balogh, 1962

Mystacozetes Balogh, 1962

Sensillus proclinate, filiform, ciliate. Interlamellar hairs absent. Lamellar hairs arising in front of cuspis, on inner margin of lamellae, inclinate, of a recumbent S-shape. Lamellae terminating considerably before rostrum, with obliquely truncate cuspides, far from each other. 2 large, semicircular, interlamellar apophysis. A single Eastern Peruvian species, $319 \times 258 \mu$ (Fig. 6).

Type species: *Mystacozetes ornatus* Balogh, 1962.

Orthozetes Balogh, 1962

Sensillus proclinate, filiform, ciliate. Interlamellar hairs absent. Lamellae not wide, leaving central portion of prodorsum uncovered, slightly convergent, cuspides removed by a distance as about their width. Interlamellar region without interlamellar apophysis. A single Eastern Peruvian species, $242 \times 177 \mu$ (Fig. 7).

Type species: *Orthozetes dispar* Balogh, 1962.

Phylacozetes Grandjean, 1936

Sensillus proclinate, filiform, ciliate. Interlamellar hairs long, arising on lamellae. Lamellar cuspides rounded, lamellar hair entirely covered by lamellae. A single Venezuelan species, $340-420 \times 285 \mu$ (according to Grandjean) (Fig. 8-9).

Type species: *Phylacozetes membranulifer* Grandjean, 1936.

Microzetes Berlese, 1913

Sensillus proclinate, filiform, ciliate. Interlamellar hairs long, arising on lamellae. Antler-shaped or angle-like lamellar apophyses on inner margin of lamellae. Lamellar hairs with long cilia. 4 securely and 4 insufficiently known species*.

Type species: *Sphaerozetes mirandus* Berlese, 1908.

* I have not included in the key the species *Microzetes mirandus* (Berlese, 1908), *Microzetes ornatissimus* Berlese, 1913, *Microzetes brevis* (Waburton, 1913) and *Microzetes auxiliaris appalachicola* Jacot, 1938, since their specific characters are not adequately described or figured. To clarify the position of these taxa, a study of the type or locotype material is indispensable.

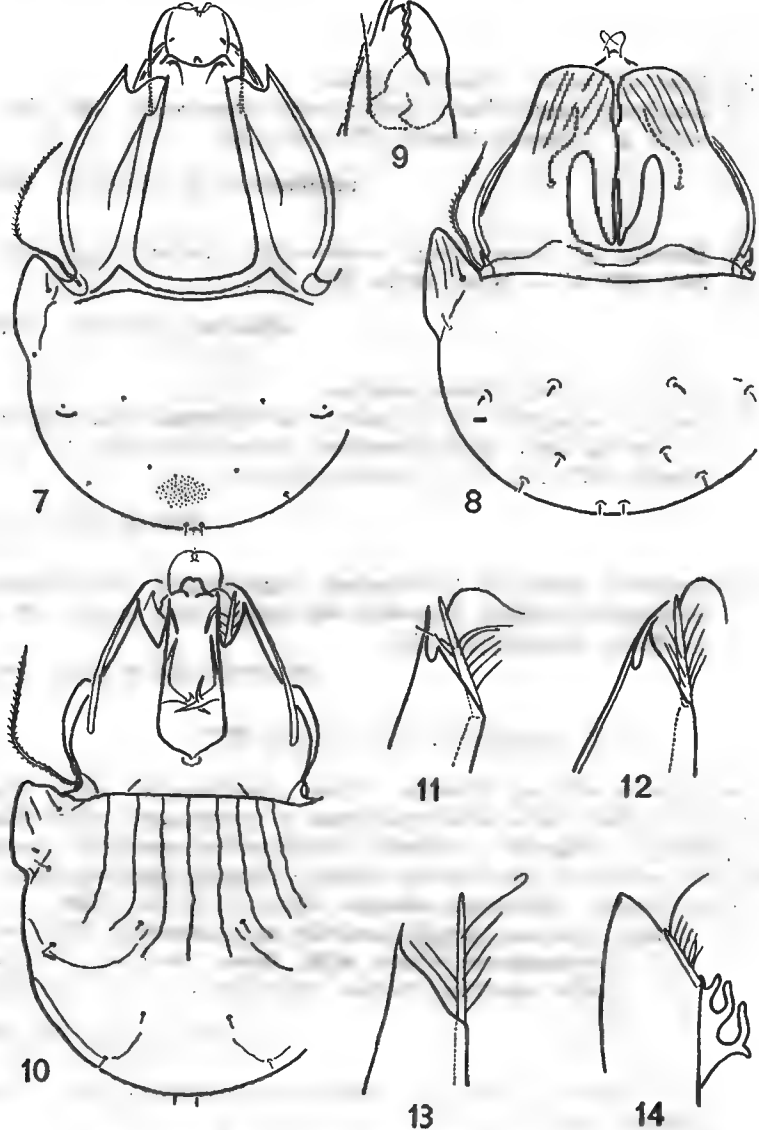


Fig. 7: *Orthozetes dispar* Balogh, 1962. — Fig. 8: *Phylacozetes membranulifer* Grandjean, 1936 (after Grandjean). — Fig. 9: *Phylacozetes membranulifer* Grandjean, 1936: mandible (after Grandjean). — Fig. 10: *Microzetes auxiliaris* Grandjean, 1936 (after Grandjean). — Fig. 11: *Microzetes auxiliaris* Grandjean, 1936: cuspis (after Grandjean). — Fig. 12: *Microzetes africanus* Balogh, 1958: cuspis. — Fig. 13: *Microzetes peruensis* Hammer, 1961: cuspis (after Hammer). — Fig. 14: *Microzetes alces* Piffel, 1961: cuspis (after Piffel).

- 1 (4) Apex of cuspis arcuately incised.
- 2 (3) Incision of cuspis short, hardly longer than wide. $195-213 \times 131 \mu$. — South America (Fig. 10—11):

auxiliaris Grandjean, 1936

- 3 (2) Incision of cuspis long, considerably longer than wide. $200 \times 120 \mu$. — West Africa (Fig. 12):

africanus Balogh, 1958

- 4 (1) Apex of cuspis without incision.
- 5 (6) Lamellar apophysis 3—4 forked, antler-shaped. Inner margin of lamellae convergent anteriorad. Lamellar hair shorter than cuspis. $192 \times 132 \mu$. — Austria (Fig. 14):

alces Piffel, 1961

- 6 (5) Lamellar apophysis 2—3-forked, angle-shaped. Inner margin of lamellae parallel. Lamellar hair longer than cuspis. 200μ . — South America (Fig. 13):

peruensis Hammer, 1961

Acaroceras Grandjean, 1936

Sensillus proclinate, filiform, ciliate. Interlamellar hairs long, arising on lamellae. No lamellar apophyses on inner margin of lamellae; but a pointed, bifurcate or fungoid interlamellar apophysis present basally in middle of interlamellar region. 7 South American species.

Type species: *Acaroceras odontotus* Grandjean, 1936.

- 1 (2) A large, chalycooid cavity medially and anteriorly of hysterosoma; hysterosoma above with dense, longitudinal lines. Interlamellar apophysis furcate. $213 \times 182 \mu$. — Eastern Peru (Fig. 15):

cavernosus Balogh, 1962

- 2 (1) No chalycooid cavity anteriorly of hysterosoma or fine, longitudinal lines.
- 3 (8) Apex of interlamellar apophysis pointed.
- 4 (5) Interlamellar apophysis short, considerably shorter than half length of lamellae. Lamellar cuspides arcuately incised. $220-260 \mu$. — Venezuela (Fig. 16):

odontotus Grandjean, 1936

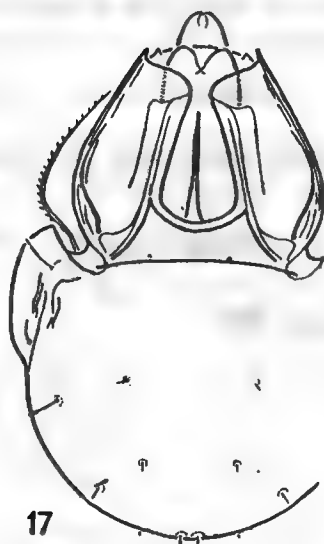
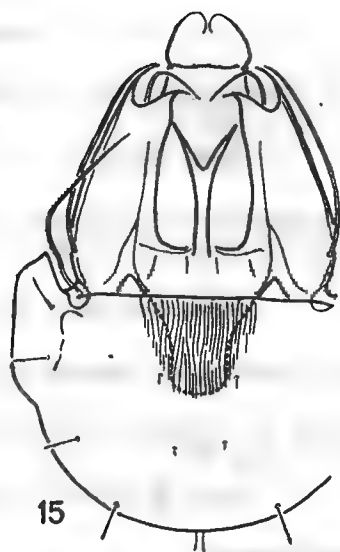


Fig. 15: *Acaroceras cavernosus* Balogh, 1962. — Fig. 16: *Acaroceras odontotus* Grandjean, 1936 (after Grandjean). — Fig. 17: *Acaroceras pugio* Balogh, 1962. — Fig. 18: *Acaroceras similis* Balogh, 1962.

- 5 (4) Interlamellar apophysis long, extending almost to cuspis. Cuspis obliquely truncate.
- 6 (7) Inner apex of cuspis rounded. Interlamellar hair not reaching cuspis. $202 \times 153 \mu$. — Eastern Peru (Fig. 17):

pugio Balogh, 1962

- 7 (6) Inner apex of cuspis pointed, two points opposite and meeting. Interlamellar hair extending beyond cuspis. $255 \times 168 \mu$. — Central Peru (Fig. 18):

similis Balogh, 1962

- 8 (3) Apex of interlamellar apophysis expanding to a fungoid shape or furcate.

- 9 (10) Interlamellar apophysis expanding to a fungoid or T-shape. $290-310 \times 236 \mu$ — Central Peru (Fig. 19):

becki Balogh, 1962

- 10 (9) Apex of interlamellar apophysis furcate.

- 11 (12) Interlamellar apophysis shorter than half length of lamellae, branches shorter than basal portion. $306 \times 207 \mu$. — Central and Western Peru (Fig. 20):

schalleri Balogh, 1962

- 12 (11) Interlamellar apophysis considerably longer than half length of lamellae, branches longer than basal portion. $223 \times 172 \mu$. — Central Peru (Fig. 21):

furcatus Balogh, 1962

Rugozetes Balogh, 1960

Sensillus proclinate, filiform, ciliate. Interlamellar hairs long, arising on lamellae, ensiform. Lamellar cuspis obliquely truncate; lamellar hairs not ciliate. Interlamellar region without lamellar apophyses and interlamellar apophysis. 1 West African and 1 South American species.

Type species: *Microzetes grandjeani* Balogh, 1959.

- 1 (2) Lamellar hairs arched, considerably longer than cuspis. Margin of interlamellar hairs straight. Entire surface of notogaster with dense, meandering, chitinous lines. $220 \times 150 \mu$. — West Africa (Fig. 22):

grandjeani (Balogh, 1959)

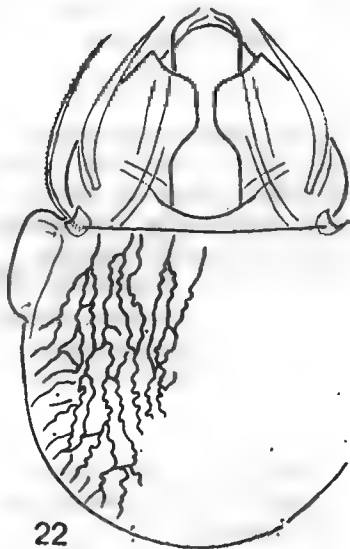
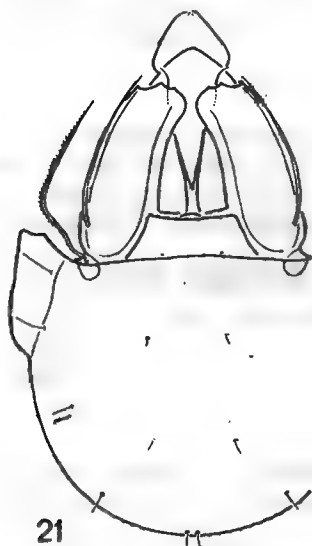
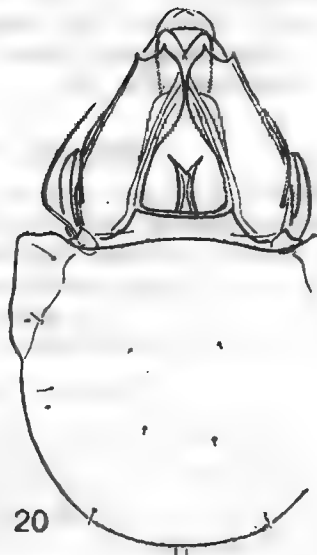
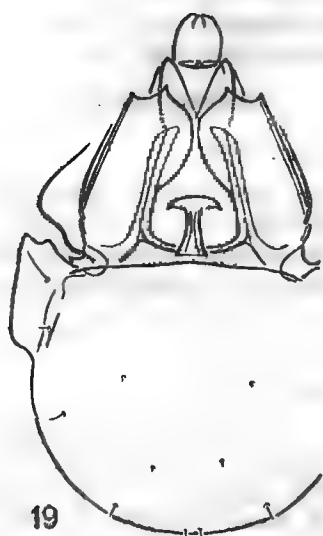


Fig. 19: *Acaroceras becki* Balogh, 1962. — Fig. 20: *Acaroceras schalleri* Balogh, 1962. — Fig. 21: *Acaroceras furcatus* Balogh, 1962. — Fig. 22: *Rugozetes grandjeani* (Balogh, 1959).

- 2 (1) Lamellar hairs straight, hardly longer than cuspis. Interlamellar hairs strikingly wide, margins irregularly and bluntly undulating. Notogaster without chitinous lines. $184 \times 134 \mu$ — Eastern Peru (Fig. 23):

gladiator Balogh, 1962

Schizozetes Balogh, 1962

Sensillus proclinate, filiform, ciliate. Interlamellar hairs arising on lamellae, probably long. Cuspis externally cleft into 2—3 pointed apices, inner side rounded. Lamellar hairs straight, without cilia. Interlamellar region without lamellar apophyses and interlamellar apophysis. A single Eastern Peruvian species, $169 \times 105 \mu$ (Fig. 24).

Type species: *Schizozetes quadrilineatus* Balogh, 1962.

Protozetes Balogh, 1962

Sensillus proclinate, short, apically incrassate, clavate. Interlamellar hairs minute, arising on lamellae. Lamellar hairs originating not on cuspides but on inner margin of lamellae, comparatively far behind, rather long, smooth. Lamellae marginal, almost parallel, far removed from each other. Without lamellar apophyses and interlamellar apophysis. A single Central Peruvian species, $205 \times 110 \mu$ (Fig. 25).

Type species: *Protozetes capitulum* Balogh, 1962.

Rhopalozetes Balogh, 1961

Sensillus proclinate or proclinate and inclinate, apically clavate or fusiform. Interlamellar hairs minute, situated on lamellae or absent. Lamellar hairs arising on cuspides. Lamellae marginal or convergent, meeting in median line. A heterogeneous genus with 1 Madagascanian and 2 South American species.

Type species: *Rhopalozetes milloti* Balogh, 1961.

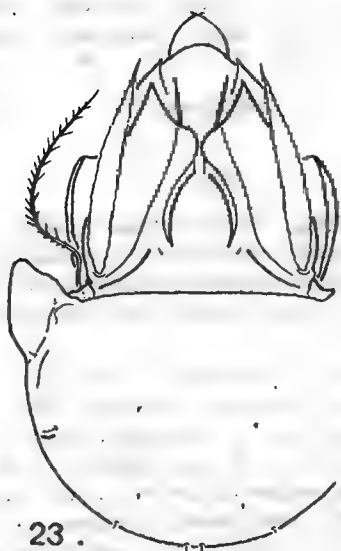
- 1 (2) Sensillus very short, fusiform, proclinate and inclinate, apically pointed. Lamellae marginal, about as far apart as width of one lamella. $200-208 \times 110-113 \mu$. — Central Peru (Fig. 26):

fusiger Balogh, 1962

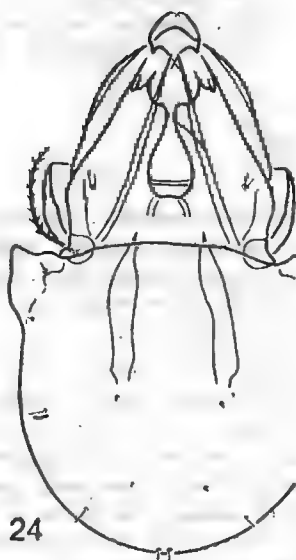
- 2 (1) Sensillus longer, proclinate apically claviform, with short hairs. Lamellae convergent, meeting or almost meeting in median line.

- 3 (4) Lamellae meeting for a long line, cuspis narrow, lamellar hair short, arched; notogaster smooth. $260-265 \times 177 \mu$. — Madagascar (Fig. 27):

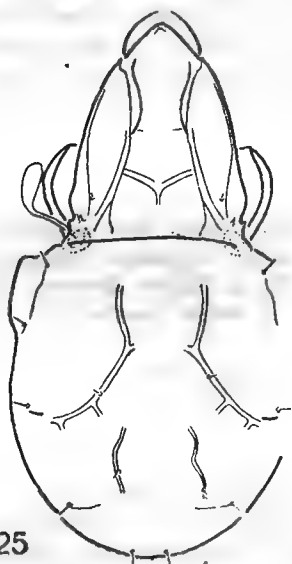
milloti Balogh, 1961



23.



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Fig. 23: *Rugozetes gladiator* Balogh, 1962. — Fig. 24: *Schizozetes quadrilineatus* Balogh, 1962. — Fig. 25: *Protozetes capitulum* Balogh, 1962. — Fig. 26: *Rhopalozetes fusiger* Balogh, 1962.

- 4 (3) Lamellae approaching each other at a single point only, cuspis wide, lamellar hair long, straight, thick. Notogaster reticulated. $187-189 \times 123 \mu$ — Eastern Peru (Fig. 28):

reticulatus B a l o g h, 1962

Anakingia H a m m e r, 1961

Sensillus proclinate, slightly fusiform. Pteromorphae hardly projecting from outline of body. Only insertion points of interlamellar hairs present. Lamellar hairs short, thick. Genital and anal plates near each other, ventral plate with longitudinal lines. A single Peruvian species, 175μ long (Fig. 29).

Type species: *Anakingia williamsae* H a m m e r, 1961.

It is doubtful whether this genus belongs to the family Microzetidae. According to H a m m e r's description and figure, there is no bacilliform process on the upper branch of the mandible, the pteromorphae not hardly protrude from the outline of the body, nor can the number of notogastral hairs be exactly established. All these characters warrant against the inclusion of the genus in the family Microzetidae. On the other hand, the ventral plate entirely conforms with the microzetid type. Due to this latter feature, I included the genus in the family under discussion. To decide the question, the revision of the type material would be highly desirable.

Miracarus K u n s t, 1959

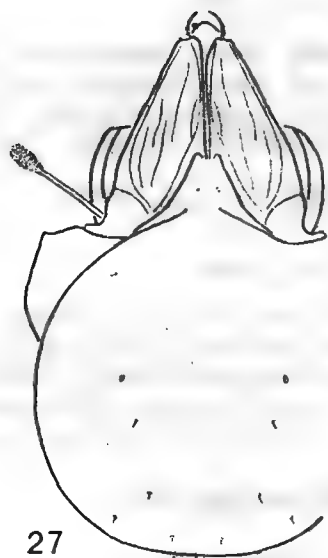
Sensillus reclinate, slightly fusiform, ciliate. Interlamellar hairs arising in interlamellar region, very short. Lamellae comparatively narrow, convergent, cuspides meeting for a longer distance. Rostral region without complicated structure. A single Southeast European species, $245 \times 158 \mu$ (Fig. 30).

Type species: *Miracarus hurkai* K u n s t, 1959.

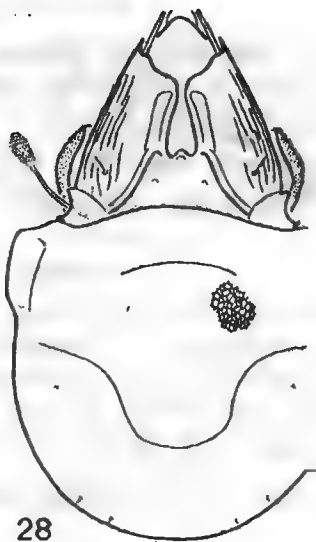
Mysterozetes H a m m e r, 1961

Sensillus external and reclinate, apically fusiform, without cilia. Interlamellar hairs originating in interlamellar region, minute. Lamellae comparatively wide, hardly convergent, cuspides not meeting. Rostral region with complicated structure. A single Peruvian species, 330μ long.

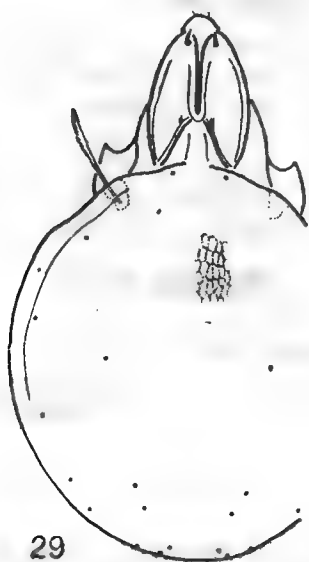
Type species: *Mysterozetes scapulatus* H a m m e r, 1961.



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Fig. 27: *Rhopalozetes milloti* Balogh, 1961. — Fig. 28: *Rhopalozetes reticulatus* Balogh, 1962. — Fig. 29: *Anakingia williamsae* Hammer, 1961. — Fig. 30: *Miracarus hurkai* Kunst, 1959.

Hymenozetes Balogh, 1961

Sensillus reclinate, filiform, apically ciliate. Interlamellar hairs originating in interlamellar region, very long, extending almost to rostrum. Lamellar hairs bifurcate, inner branch much smaller than external one. Interlamellar region quadrangular. A single Madagascarian species, $440 \times 303 \mu$ (Fig. 32).

Type species: *Hymenozetes mirabilis* Balogh, 1961.

Oxyzetes Balogh, 1958

Sensillus reclinate, filiform, with rather long cilia. Interlamellar hairs originating in interlamellar region, very long, extending to rostrum. Lamellar hairs originating on inner margin of lamellae. Lamellae strongly convergent, interlamellar region triangular. Pteromorphae with projecting, pointed process. A single West African species, $216 \times 180 \mu$ (Fig. 33).

Type species: *Oxyzetes pectiniger* Balogh, 1958.

Nellacarus Grandjean, 1936

Sensillus reclinate. Interlamellar hairs arising on lamellae, very small. Lamellae almost parallel, near each other, inner margins meeting for a long distance. 4 European and 1 South American species.

Type species: *Nellacarus petrocariensis* Grandjean, 1936.

- 1 (2) Sensillus comparatively thick, bacilliform, with scattered punctation, without cilia. $247-271 \times 174-184 \mu$. Eastern Peru (Fig. 35):

discrepans Balogh, 1962

- 2 (1) Sensillus thin, filiform discernibly ciliate.
- 3 (4) Lamellar hair sphaerical, extremely short, exterior apex of cuspis as long as interior one. — Southeastern Europe (Fig. 36):

baloghi Jeleva, 1962

- 4 (3) Lamellar hair bacilliform, normal.
- 5 (6) Dorsosejugal suture absent in middle. External apex of cuspis considerably longer than internal one. $260-275 \times 140-155 \mu$. — Pyrenées:

pyrenaicus Travé, 1956

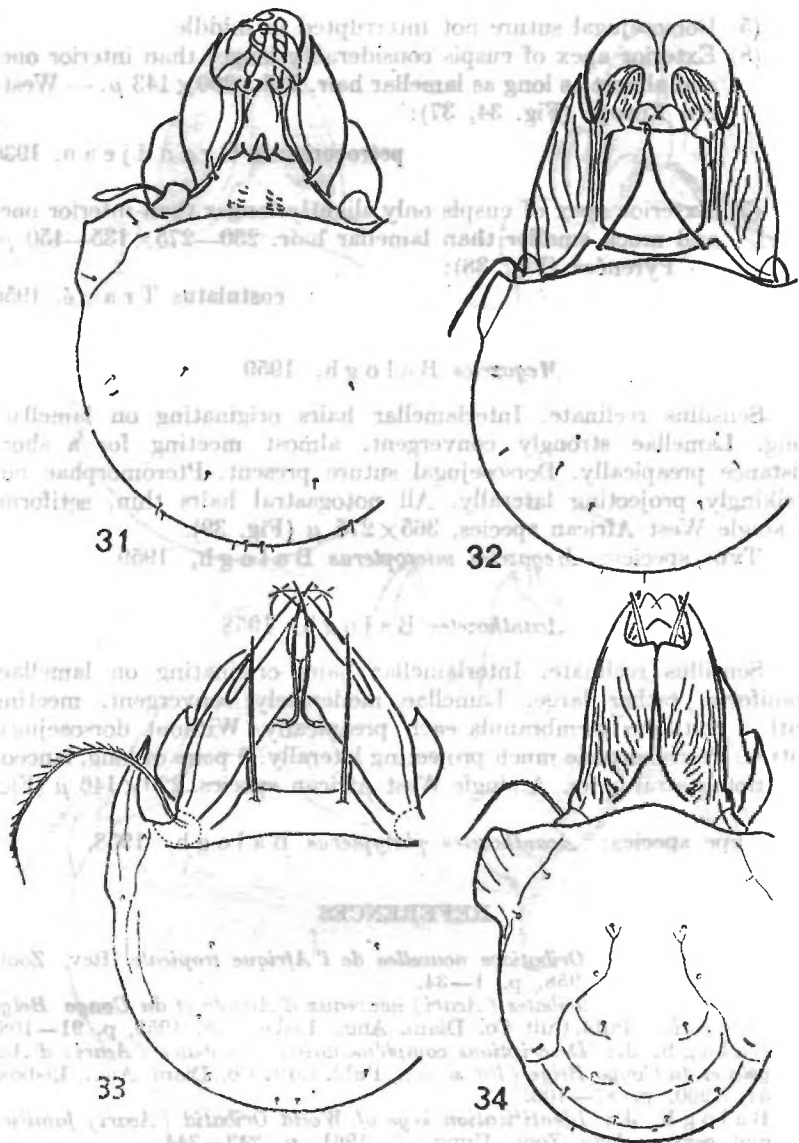


Fig. 31: *Myserozetes scapulatus* Hammer, 1961. — Fig. 32: *Hymenozetes mirabilis* Balogh, 1961. — Fig. 33: *Oryzetes pectiniger* Balogh, 1958. — Fig. 34: *Nelloecarus petrocoriensis* Grandjean, 1936 (after Grandjean).

- 6 (5) Dorsosejugal suture not interrupted in middle.
 7 (8) Exterior apex of cuspis considerably longer than interior one, and almost as long as lamellar hair. $235-260 \times 143 \mu$. — Western Europe (Fig. 34, 37):

petrocoriensis Grandjean, 1936

- 8 (7) Exterior apex of cuspis only slightly longer than interior one, and much smaller than lamellar hair. $250-275 \times 135-150 \mu$. — Pyrenées (Fig. 38):

costulatus Travé, 1956

Megazetes Balogh, 1959

Sensillus reclinate. Interlamellar hairs originating on lamellae, long. Lamellae strongly convergent, almost meeting for a short distance preapically. Dorsosejugal suture present. Pteromorphae not strikingly projecting laterally. All notogastral hairs thin, setiform. A single West African species, $365 \times 275 \mu$ (Fig. 39).

Type species: *Megazetes micropterus* Balogh, 1959.

Acanthozetes Balogh, 1958

Sensillus reclinate. Interlamellar hairs originating on lamellae, spiniform, rather large. Lamellae moderately convergent, meeting with a chitinous membranula each preapically. Without dorsosejugal suture. Pteromorphae much projecting laterally. 3 pairs of long, lanceolate notogastral hairs. A single West African species. $220 \times 146 \mu$ (Fig. 40).

Type species: *Acanthozetes platypterus* Balogh, 1958.

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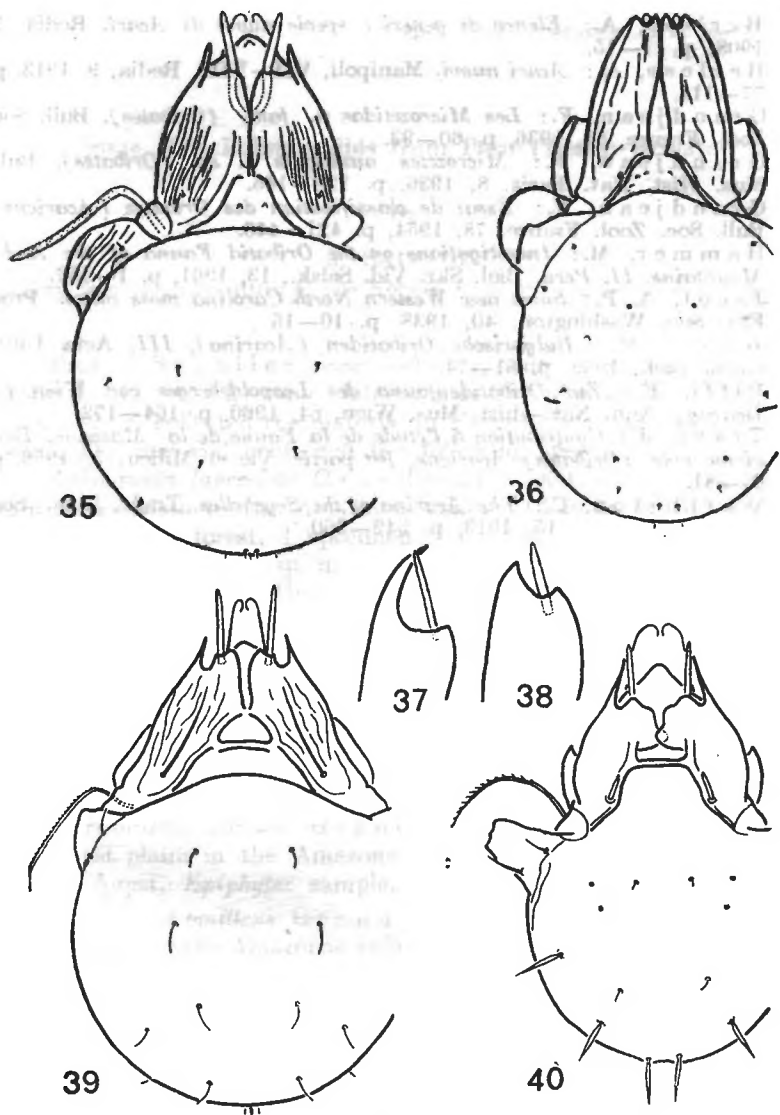


Fig. 35: *Nellacarus discrepans* Balogh, 1962. — Fig. 36: *Nellacarus baloghi* Jeleva, 1962. — Fig. 37: *Nellacarus petrocoriensis* Grandjean 1936: cuspis (after Grandjean). — Fig. 38: *Nellacarus costulatus* Travé, 1956 (after Travé). — Fig. 39: *Megazetes microp-terus* Balogh, 1959. — Fig. 40: *Acanthotezes platypterus* Balogh, 1958.

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